



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
25 FUNSTON ROAD
KANSAS CITY, KANSAS 66115

December 12, 1989

MEMORANDUM

SUBJECT: Trip Report and Data Summary
Fruit Stand (Hellwig)
Chesterfield, St. Louis County, Missouri

FROM: Reta E. Roe
FIRE/EP&R/ENSV *RR*

TO: John R. Helvig
Chief, EP&R/ENSV

I. INTRODUCTION

A. Site Location

The Hellwig Retail Fruit Market is on the south side of Chesterfield Airport Road near the St. Louis County Correctional Institution in an area formerly known as Gumbo. Chesterfield Airport Road is the Old Highway 40.

B. Site Description

The site is on flat to gently sloping ground, and in an area that is largely agricultural with some industrial activity. A few farmhouses are located close by on the north side of the highway. The site is near retail businesses and the Chesterfield Executive Park (an industrial park). Because of its location in the flood plain, plat maps do not contain section numbers.

C. Site History

The Fruit Stand (Hellwig) has been in business for over 20 years. The site has been leased by Denny Moore for over 8 years and was formerly owned by the Hellwig brothers (George and Henry). Currently, the property is owned by Anna (Mrs. Henry) Hellwig. Mr. George Hellwig recalls that the parking lot at the fruit stand was once sprayed with oil. Gary Lambarth and Jesse Orr reported spreading oil on a site during the early 1970s in this location which was described as "a group of fruit stands."

Environmental containment actions are proposed because of the widespread contamination of site properties by 2,3,7,8-tetrachlordibenzo-p-dioxin (TCDD). This dioxin was generated in the production of organic chemicals at a facility in southwest Missouri in the early 1970s. The dioxin-contaminated waste was subsequently transported to eastern Missouri and disposal activities have caused widespread contamination at over 40 separate locations. Since the 1950s, numerous health studies have been conducted on this chemical due to its extreme toxicity and the remarkable stability of the substance in biological systems. As a result of these studies, federal and state health officials have stated it is reasonable to presume that mere traces of TCDD in the environment may have adverse effects on the health of both animal and human populations.

II. OBJECTIVES

Preliminary soil sampling for dioxin for the purpose of determining whether the soil on the site has been sprayed and contaminated with dioxin was done on September 26, 1989. Discrete samples were collected where the unpaved street used to be which involved coring about 8 inches beneath the chip-and-seal paving.

Sampling Results

TX3

<u>Sample #</u>	<u>Location</u>	<u>2,3,7,8-TCDD*</u>
001	Hellwig-Site Two Blank	0.300U**
002	Hellwig-East Side of Parking Drive	51.759
003	Hellwig-Center of Parking Drive	33.816
004	Hellwig-West Side of Parking Drive	127.725
005	Hellwig-North end of West Driveway	99.446
006	Hellwig-South end of West Driveway	17.345

*All units are in ppb

**Below detection levels

The purpose of sampling on October 5 was to determine whether the contamination was confined under the chip-and-seal coating on the parking area/driveways or whether contaminated soil and dust was on the surface of these areas and had possibly been tracked or blown into the building.

Wipe samples were taken from the interior and exterior walls, interior fixtures, and, at the request of health personnel, from the pumpkin display in the parking lot.

Sweep samples were taken of the three distinct areas of the building, both side parking areas, and the front drive/parking area.

Results of the Sampling*

90P7EH

<u>Sample #.</u>	<u>Location</u>	<u>Type</u>	<u>Results</u>
013	Interior Wall By Phone	Wipe	0.400U**
014	Counter top near Cash Register	Wipe	0.400U
015	Light Fixture Inside Building	Wipe	0.400U
016	Fan Inside Building	Wipe	0.400U
023	Cooler Case Inside Building	Wipe	0.400U
024	Exterior Wall	Wipe	0.400U
025	Pumpkin in Parking Lot Display	Wipe	0.400U
026	Blank	Wipe	0.400U
001	Back Third of Building	Sweep	5.549
002	Middle Part of Building	Sweep	0.916
003	Front Part of Building (Retail)	Sweep	0.365
004	West Driveway about Midway	Sweep	3.255
005	West Driveway--North End	Sweep	2.431
006	East Driveway	Sweep	0.300U
007	North Driveway/Parking--East Side	Sweep	1.979
008	North Driveway/Parking--West Side	Sweep	175.791

*Units for wipe samples are in picograms/square centimeter
Units for sweep samples are in nanograms/gram

**U denotes value below detection level

All the wipe samples were below detection levels, but the sweep samples indicate that the chip-and-seal coating is not containing the contamination. Also contamination is blowing into and/or being tracked into the building.

A 95 percent confidence sampling was initiated on November 1, 1989, to delineate the extent and level of contamination. The site was surveyed, divided into sections, and sampled. The Standard Operating Procedure (SOP) for 95 percent confidence sampling of dioxin was used. This is detailed in A Sampling Strategy for Remedial Action at Hazardous Waste Sites: Cleanup of Soil Contaminated by Tetrachlorodibenzo-p-Dioxin. In general, the site is surveyed and divided up into areas of 5,000 feet or less. Each area is staked, and the area is divided into 10 feet by 10 feet blocks. The center of each block is flagged and a minimum of three composite samples are taken from each area. The composite sample is usually composed of 50 aliquots, one from each block. Each aliquot in a composite sample is approximately the same distance and direction from each of the block flags in the area. The aliquots are homogenized and a portion is removed for the sample. The above-cited article can be referred to for the statistical rationale and computation of upper confidence limits.

All adjoining sections to any section which had contamination above the 95 percent confidence level guidelines were also sampled in the same manner until clean sections were found on all sides of the site.

Each sample used new or decontaminated equipment so that contamination was not transferred between samples. Decontamination was with alconox in water followed by a methanol and water rinse.

After compositing according to SOP, samples were placed in whirlpak bags. These bags were overwrapped into larger plastic bags and placed in an ice chest for shipment to TMS by air freight. No preservation is necessary for dioxin samples, and there is no set holding time.

Samples were documented in the field on field sheets. A chain-of-custody was kept. The Sample Management Office Statement of Work for Rapid Turnaround Dioxin Analysis (Revised June 19, 1987) was used for data and sample management.

Samples were analyzed by Method No. 7801S00 which is the method used by TMS for analyzing dioxin in soil. The detection level for this method is 0.3 ng/g.

Results of the Sampling

<u>Section No.</u>	<u>Results*</u>	<u>UCL**</u>	<u>Approx. sq. ft.</u>
1	10.711 20.534 11.041	23.5	3262
2	84.995 52.888 78.416	100.7	6525
3	0.300U*** 0.300U 0.300U	0.3	2036
4	2.530 2.941 2.198	3.2	1980
5	85.906 87.374 104.449	110.0	4399
6	142.584 116.179 145.430	161.9	4851
7	1.741 8.532 4.138	10.6	3800
8	41.939 52.947 39.141	57.0	3367
9	48.221 68.898 40.241	77.4	3442
10	27.149 27.738 15.196	35.3	4472
11	0.300U 0.300U 0.300U	0.3	2608
12	2.310 2.195 1.925	2.5	2269

<u>Section No.</u>	<u>Results*</u>	<u>UCL**</u>	<u>Approx. sq. ft.</u>
13	0.440 0.434 0.691	0.8	3280
14	1.508 1.558 1.234	1.7	2491
15	1.174 1.228 0.952	1.4	1582
17	0.300U 0.300U 0.300U	0.3	
18	0.300U 0.300U 0.300U	0.3	
19	0.300U 0.300U 0.300U	0.3	
20	0.300U 0.300U 0.300U	0.3	
21	0.300U 0.300U 0.300U	0.3	
22	0.300U 0.300U 0.300U	0.3	
23	0.300U 0.300U 0.300U	0.3	
24	0.300U 0.300U 0.300U	0.3	
25	0.300U 0.300U 0.300U	0.3	

<u>Section No.</u>	<u>Results*</u>	<u>UCL**</u>	<u>Approx. sq. ft.</u>
26	0.300U 0.300U 0.300U	0.3	

*Units are nanograms/gram

**95 percent Upper Confidence Level (UCL)

***Below detection levels

Quality Assurance/Quality Control

<u>Number</u>	<u>QC Code</u>	<u>TCDD Concentration</u>
OOBN55154P	Meas. Standard	1.305
OOBN55154T	True Standard	1.282
OOBN59302	Meas. Lab Spike	0.992
OOBN59302R	Lab Spike	1.000
OOBN55141P	Meas. Standard	1.351
OOBN55141T	True Standard	1.282
OOBN59306	Meas. Lab Spike	0.977
OOBN59306R	Lab Spike	1.000
OOBN55702P	Meas. Standard	1.597
OOBN55702T	True Standard	1.282
OOBN59291	Meas. Lab Spike	1.007
OOBN59291R	Lab Spike	1.000
OOBN55118P	Meas. Standard	1.146
OOBN55118T	True Standard	1.282
OOBN59325	Meas. Lab Spike	1.019
OOBN59325R	Lab Spike	1.000
OOBN55121P	Meas. Standard	1.214
OOBN55121T	True Standard	1.282
OOBN59310	Meas. Lab Spike	1.978
OOBN59310R	Lab Spike	1.000

Quality Assurance (QA) results for an individual batch of samples were used to determine if the sampling and analytical procedures meet acceptable criteria for precision and accuracy. Statistical analysis of all QA samples combined were used to quantify the overall precision and accuracy of data collected during the sampling program. The SOP for this procedure is No. 2935, Quality Assurance for the Office of Emergency and Remedial Response.

Quality Assurance (QA) calculations are from 40 CFR Chapter 1, page 58, Appendix A, pages 130-133 and U.S. EPA, 1980, Interim Guidelines and Specifications for Preparing Quality

Assurance Project Plans, QAMS-005/80, December 29, 1980, Office of Monitoring Systems and Quality Assurance, ORD, U.S. EPA, Washington, D.C. 20460.

Accuracy is the closeness of agreement between an observed value and as accepted reference value. Applied to a set of observed values, accuracy is a combination of a random component and a bias component.

Accuracy is calculated by the percentage difference (d_i) for each audit concentration using:

$$\bullet d_i = \frac{Y_i - X_i}{X_i} \times 100$$

- Where Y_i = analyzed concentration
 X_i = actual concentration

The accuracy would then be the average (D) of these percentages.

- $D = \frac{1}{n} \sum_{i=1}^n d_i$
- d_1 (spike) = 9.5
- d_2 (lab spike) = 1.6
- $D = 5.5$

The bias is the deviation of the measured value from an accepted reference value (T or R) of known spike amount (P).

Bias can be calculated by:

- $B = P - T$ (Standard) or
- $B = K - R$ (Spike)
- Where K = measured value of lab spike

Bias for the five groups of QA in this sampling ranged from 0.007 to 0.315.

The standard deviation (S_a) is calculated by:

- $S_a = \left(\frac{1}{n-1} \left[\sum_{i=1}^n d_i^2 \right] - \frac{1}{n} \left(\sum_{i=1}^n d_i \right)^2 \right)^{\frac{1}{2}}$
- $S_a = 5.6$

The upper 95 percent probability limit is given by:

- Limit = $D + 1.96 S_a$
- Limit = 16.5

Precision is calculated by the percent difference (d_i):

$$d_i = \frac{Y_i - X_i}{(Y_i + X_i)/2} \times 100$$

$$d_1 \text{ (spike)} = 18.4$$

$$d_2 \text{ (lab spike)} = 1.6$$

The pooled precision (D) is:

$$D = \frac{\sum n_i d_i}{\sum n_i}$$

$$D = 10$$

A commonly used estimate of precision is the relative standard deviation (RSD) or the coefficient of variation (CV).

- $RSD = CV = 100 S/\bar{x}$
- Where \bar{x} is the arithmetic means of the standard
- $RSD = 100 (0.1192/1.3226)$
- $RSD = 9.01$

Standard deviation (S_a) from above is used for the 95 percent confidence level:

- Limit = $D \pm 1.96 S_a$
- Upper Limit = 21.0
- Lower Limit = -1.0

The completeness is the percentage of total data which meets the QA guidelines which in this case is 100 percent.

III. THREATS TO HEALTH AND THE ENVIRONMENT

For most hazardous substances, the Agency for Toxic Substances and Disease Registry and the Environmental Protection Agency use different levels of exposure or concentration to determine the necessary response. For a residential dioxin site, the 1 ppb action level is considered appropriate for both emergency situations and

less immediate risks normally addressed as remedial actions. Because of the nature of a retail business serving the general public and the continuous exposure to the employees, a single action level is appropriate here although the area is not primarily residential

Exposure is by inhalation, ingestion, and dermal contact. Dust particles would be the major exposure pathway at the site.

IV. CONCLUSIONS AND RECOMMENDATIONS

The contaminant is present in the soil and is spread by wind and water erosion. The flat to gently sloping ground without wind-breaks provides easy access for wind erosion and water erosion. In addition, the location in the flood plain could accelerate contaminant spread in the event of flooding. Currently, contaminants could be transferred off site on vehicle tires and shoes.

TCDD levels in the sweepings off the parking lot at the fruit stand have been documented at levels over 170 ppb. Concentrations of TCDD in excess of the action level have spread from the original sprayed area to adjoining portions of the site, and even into the building. It is expected that the spreading of contamination from the site will continue as there is open access to the site and vehicles could potentially spread contamination by adherence to their tires and by raising dust during dry weather. Runoff and flooding during wet weather could also spread contamination.

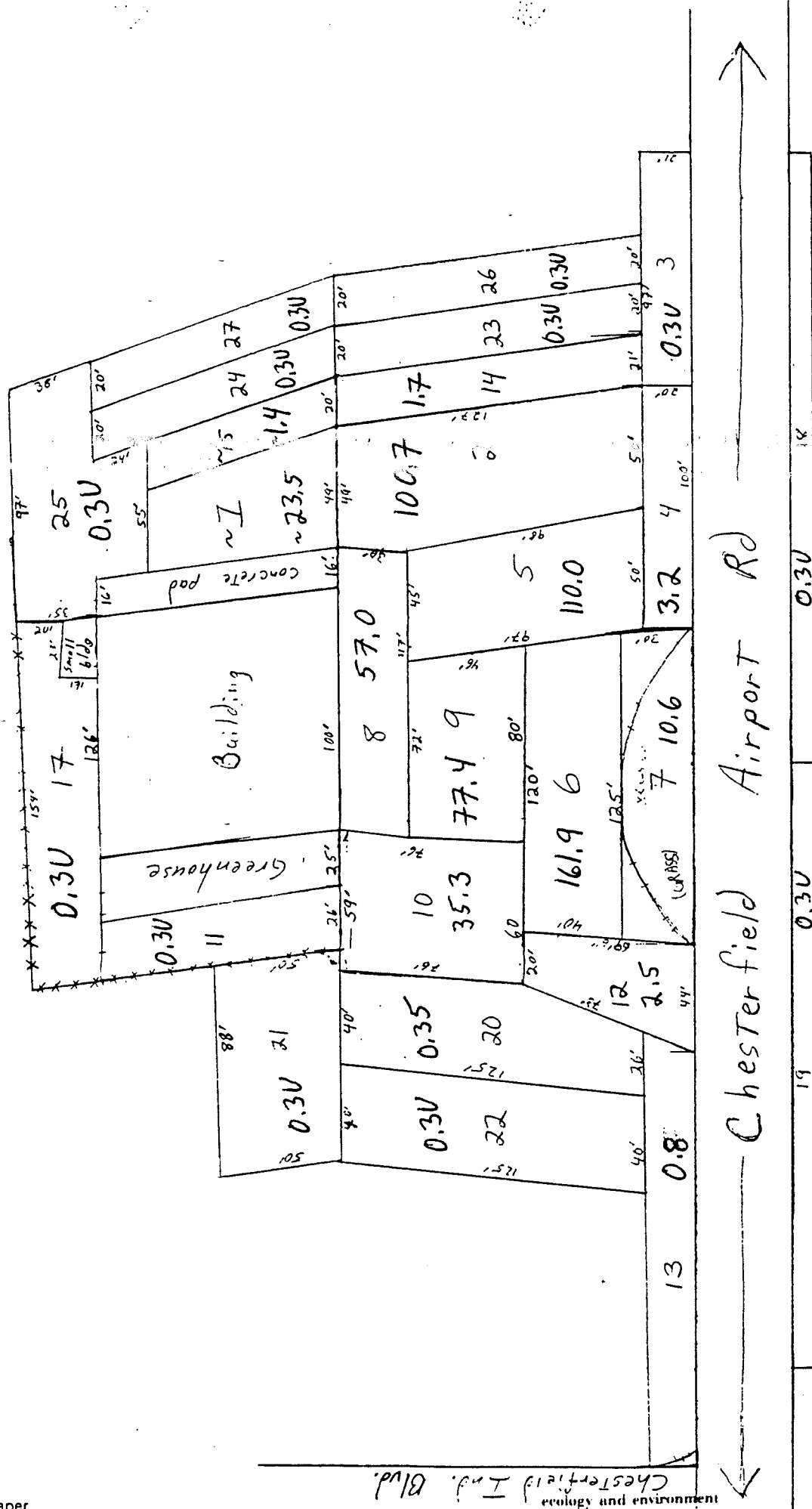
The areas have been identified that exhibit TCDD surface contamination at levels exceeding 1.0 ppb. The contaminant levels were established through sampling protocol developed to provide data at the 95 percent UCL.

TCDD is a hazardous substance and considered to be of critical concern. The entire parking area and west drive, an area of about 42,400 square feet, as well as the building, are contaminated at levels exceeding the 1 ppb level for residential areas.

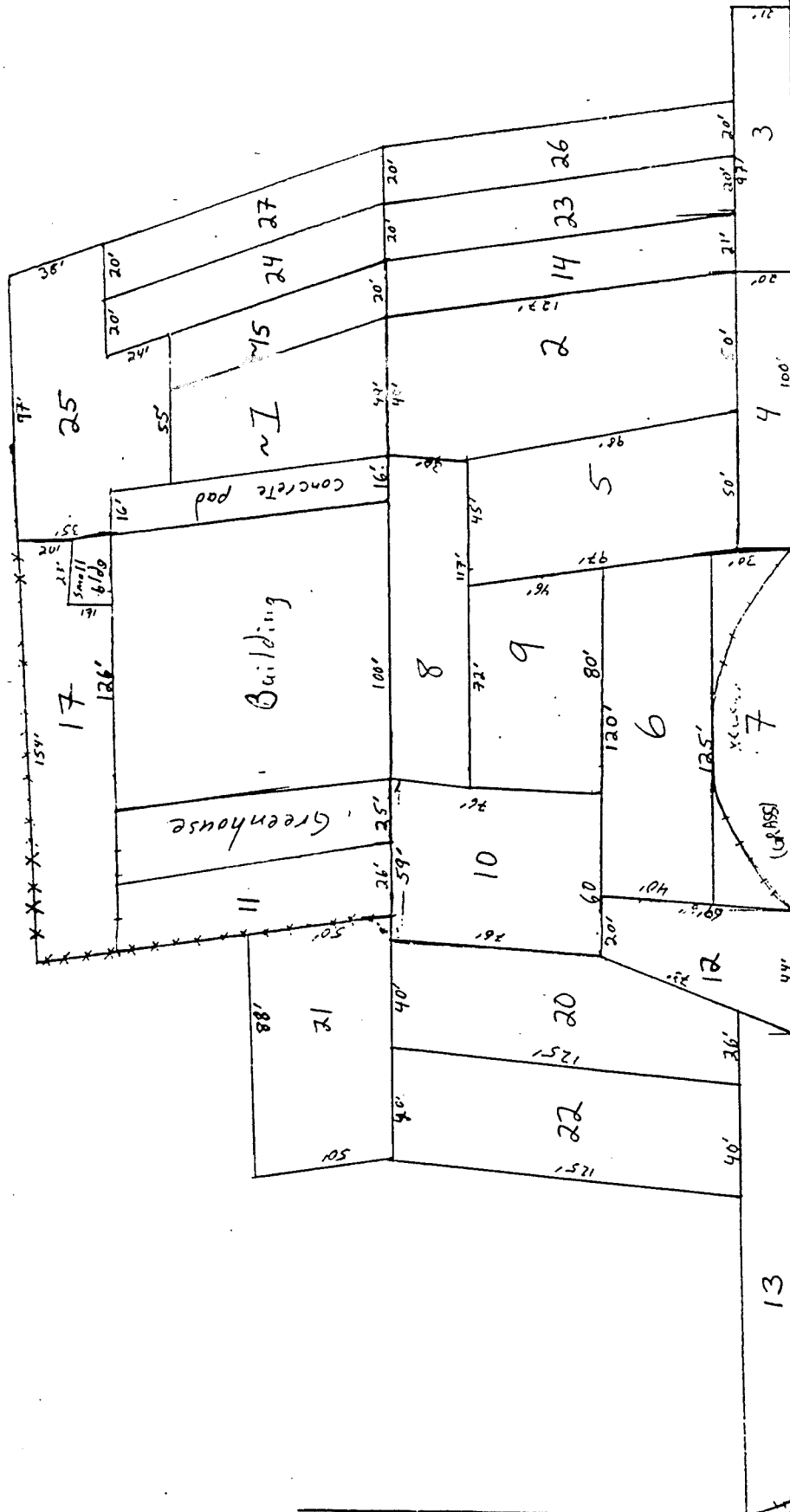
Because of the threat to health and the environment, I recommend that a removal action be performed at this site to mitigate the threat and stabilize the site.

Attachments

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Hellwig's Retail Sketch Map
11/17pm



Chesterfield Airport Rd

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